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ABSTRACT

Intended for teachers of grades 6 through 12 who wish to incorporate information on energy and energy conservation into drama, poetry, literature, or research instruction, this guide offers lesson plans to educate elementary or secondary students about energy through class activities. An introduction explains the need for such instruction, and offers five concepts students should understand after experiencing the activities: (1) energy is basic; (2) energy usefulness is limited; (3) the environment is affected by energy exchanges; (4) energy conservation is necessary; and (5) everyone can shape and share the future of energy. Following a list of committee members and an introductory letter are 17 lesson plans based on the five concepts, including activities for writing poems about energy, researching energy issues and roleplaying various viewpoints, finding songs about energy, staging puppet and mime shows, and debating energy issues. (JC)

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IOWA DEVELOPED ENERGY ACTIVITY SAMPLER

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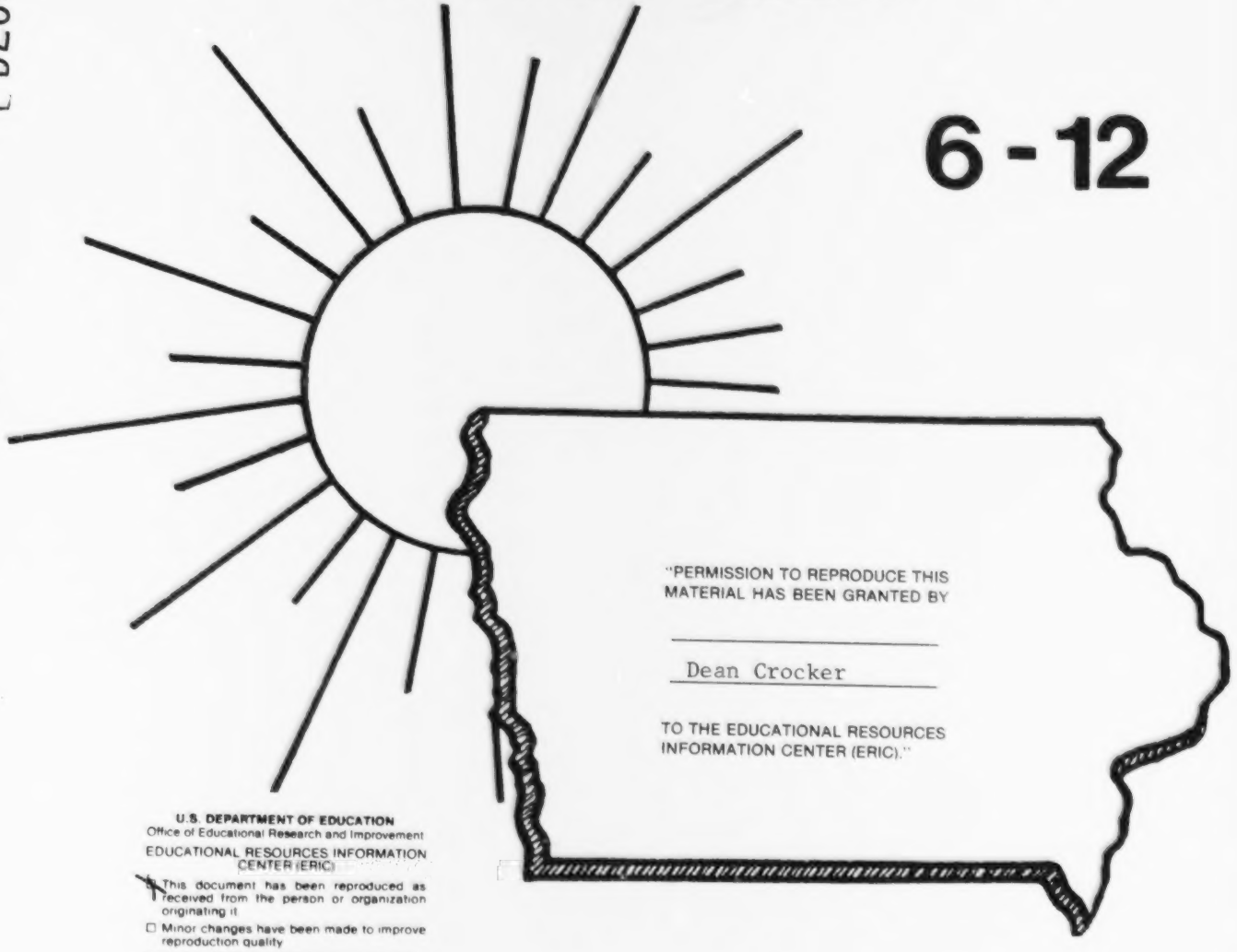

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LANGUAGE & CREATIVE ARTS

Revised 1987

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REVISED IOWA DEVELOPED ENERGY ACTIVITY SAMPLER - IDEAS

INTRODUCTION TO IDEAS

The revised IDEAS were developed from the Energy Conservation Activity Packets, (ECAPS), by Ruth Bakke, and Iowa Developed Energy Activity Sampler (IDEAS), developed by Dr. Doris G. Simonis under the auspices of the Iowa Energy Policy Council and the Iowa Department of Public Instruction, now the Iowa Department of Education. An "infusion model" was used as a basic framework which recognized the interdisciplinary nature of energy education concepts. These included:

1. Energy is basic.
2. Energy usefulness is limited.
3. Environment is impacted by energy exchanges.
4. Energy conservation is needed.
5. The future of energy is ours to shape and share.

The revised IDEAS adheres to these concepts and provides activities that utilize a learning cycle to develop a knowledgeable student population concerning energy matters. Decision-making skills are emphasized and developing an energy conservation ethic is a major goal.

Under the joint sponsorship of the Iowa Department of Education, Duane Toomsen, Environmental and Energy Education Consultant, and the Energy Division of the Iowa Department of Natural Resources, Dr. W. Tony Heiting, Coordinator; the revised Iowa Developed Energy Activity Sampler (IDEAS) was created to meet the continuing need for energy education from the 1980's into the twenty-first century.

Conservation of natural resources and environmental awareness has been mandated by the State of Iowa to become a part of the quality education experienced by Iowa's future citizens in grades K-12. Energy is an integral part of our nation's natural resource base. The major emphasis of IDEAS is to provide uniquely designed K-12 classroom activities that are adaptable into various classroom situations, i.e., highly populated, urban schools to less populated rural facilities. The focal points of IDEAS are: energy concerns, impacts, choices, challenges, and conservation.

Revised IDEAS adopts a learning cycle strategy based upon the learning theory of Jean Piaget. The cycle has three phases: awareness, concept development and application. Activities are loosely structured to allow for student exploring, hypothesizing, and decision-making.

Awareness activities encourage students to experience a new idea, phenomenon or perception. A variety of experiences should stimulate the students' interest, appreciation, and initiate a positive attitude toward the concept to be formulated. Concept development involves the building of a concept of energy based upon the awareness phase. Concept development may include such activities as reading, performing experiments, solving problems, group interactions, games and role-playing in order to reinforce the developing concept. The application phase is designed to enable the student to apply the new concept to various situations or problems. Application activities may include the same types of activities plus a gamut of others, including debates, panels, simulations, surveys, designing, constructing and community or school projects.

This learning cycle approach integrates content with processes and encourages the development of higher level reasoning and thinking skills. The interdisciplinary importance of energy education is emphasized.

The activity format used in the revised edition of IDEAS includes a title, subject and grade level designation, a short description of the activity, learning objectives, materials needed, approximate time required, and descriptions of the three phases of the activity. A suggested evaluation section has been included, in most packets, to assist the instructor and/or learner in determining the extent to which each learner achieved each objective. Follow-up or background information and a detailed activity description complete the format.

Iowa is an excellent example of how energy is an interrelated and interdependent resource. Iowa imports 98% of the energy it uses and has a high potential for reducing its dependence on outside energy sources through conservation and alternative energy forms. Iowa's current energy dependence has a major impact on Iowa's economy and the ability of the state to compete in the industrial and agricultural community. All segments of Iowa's society involving service-related employment, agriculture, and industry, are impacted by energy costs and availability.

The most obvious means of energy reduction is energy conservation. More efficient use of energy resources available in Iowa (i.e. coal, wind, hydro, solar, gasohol, biomass) can have a significant impact on the cost of production/distribution factors as fossil fuels begin to diminish in the twenty-first century.

The revised IDEAS were developed by classroom teachers who realize the need to provide students with an enriched curriculum. Iowa's tradition of excellence in education has always pointed toward an improved future for our youth. IDEAS will provide the creative educator with a multitude of activities from which they can choose, adapt, and improve.

The professional educator who uses IDEAS may adapt the activities for any classroom setting. Students will be given the basis to form an energy attitude, ethic, and philosophy which will serve them and the citizens of Iowa throughout life.

Members of the IDEAS Revision Committee

Duane Toomsen, Environmental and Energy Consultant, Department of Education

Dr. Tony Heiting, Research/Education Director, Energy Division, Iowa Department of Natural Resources.

Dr. Bob Vanden Branden, University of Northern Iowa, editor.

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CREATIVE AND LANGUAGE ARTS

INTRODUCTION

During my tenure as Energy Education Consultant for the Iowa Department of Education, I discovered that many people considered the study of energy to belong only to the natural and social scientists. Our efforts in the arts and humanities were observed skeptically by some in the energy establishment.

But other far-sighted colleagues embraced the joyful educational experiences we shared through music, drama, magic, movement, and the visual arts. Because of the excitement, the Creative Arts were added to the excellent IDEAS series.

You will not find facts, figures or technical expertise in these exercises. Rather, you will find arts experiences that encourage energy awareness, energy literacy, valuing in energy issues, and personal choice and responsibility in energy decision-making.

Access to the arts occurs at all levels, so all of the activities herein are listed for grades 6-12. They may be adapted to any skill level as needed. Further, you will note the absence of evaluative instruments. The quality of the energy education in these exercises comes from participating in them, not through comparison to some aesthetic touchstone. You will also discover that many of these have a community component in the "Application" phase. Share the learning. Share the excitement!

Finally, this collection is truly a "Sampler" of just a few "seed" exercises to stimulate your own creativity. We hope these activities will encourage you to try new and exciting exercises of your own. Check out the IDEAS Language Arts Sampler, a NEED packet, the EEIA Newsletter and other sources as well. Then, share the results with the rest of us. It's time to put some Energy in the Arts!

Dr. Doug Larche, Chair
Creative and Performing Arts
Grand View College

Metre Made

SUBJECT Creative Language Arts: Creative Writing/Poetry

LEVEL 6 - 12

ACTIVITY IN BRIEF

Students will gather energy vocabulary words, thoughts and concepts, and incorporate them into free verse, rhyming poetry, and haiku.

OBJECTIVE

At the end of this activity the student will: (1) Know the meaning of at least forty energy vocabulary words; (2) Have discussed and formulated opinions about energy concepts; (3) Have written free verse, rhyming poetry and haiku about energy.

MATERIALS

Paper and Pencils/Pens
Energy vocabulary lists

TIME

2 hours

LEARNING CYCLE

AWARENESS - Students will be provided the list of energy terms, and will be asked to look up meanings and add new words to the list.

CONCEPT DEVELOPMENT - By manipulating energy vocabulary words, thoughts and concepts into the poetic structure of free verse, rhyming poetry and haiku, students can become more familiar with them, better learn their meanings, and learn to use them in context.

APPLICATION - Try copying, binding and distributing a collection of students' work. An evening of students reading poetry might contribute to community awareness. The poems might eventually be used in a readers theatre.

FOLLOW-UP/BACKGROUND INFORMATION

Energy Vocabulary Words:

solar	geothermal	natural gas
coal	oil	fusion
fission	nuclear	hydroelectric
biomass	wind	fossil fuels
renewable	non-renewable	tidal
sea gradient	conservation	electricity
kinetic	potential	fuel
energy	BTU	environment

energy cost	photovoltaic	solar cell
conversions	heat	light
sound	motion	power
chemical	soft-path	off-shore
mining	strip-mining	oil wells
sources	OPEC	

How to Write a Haiku:

A Haiku is a Japanese verse form made up of three lines of unrhymed poetry of 5, 7, and 5 syllables respectively. It is usually written about some subject in nature.

Here are some examples:

The earth belches heat
from deep inside her belly
screaming, "Use me, please!"
- Dr. Doug Larche

Tides surge restlessly
Soft winds move clouds and machines
Sun, the Mother, smiles.
- Dr. Doug Larche

In the warmth of love
I fight winter's icy chill
You - my energy.
- Dr. Doug Larche

The sun's energy
Beauty, production, pleasure
Fun, work, happiness.
- Duane Toomsen

SOURCE OF ACTIVITY

I.D.E.A.S. And Dr. Doug Larche

Amazing Stories

SUBJECT Creative Language Arts: Creative Writing/Prose **LEVEL** 6 - 12

ACTIVITY IN BRIEF

Students will engage in creative thinking and discussion about potential energy futures, then write first-person stories about a day in the lives of their grandchildren.

OBJECTIVE

At the end of this activity the student will: (1) Know the concepts of "soft path" and "hard path" energy use; (2) Have discussed and formulated opinions about the results of each; (3) Have written a first-person story about energy futures.

MATERIALS

Paper and Pencils/Pens

TIME

2 hours

LEARNING CYCLE

AWARENESS - Students will think inventively and discuss the differences between a "soft energy path" and a "hard energy path".

CONCEPT DEVELOPMENT - By carefully considering the potential future impacts of both "soft" and "hard" energy paths, students can better understand the relationship between choice and consequence, and can examine personal values and priorities in choicemaking.

APPLICATION - consider having students become "storytellers" of their energy futures for elementary classrooms. The stories may be collected and published or used in a readers' theater. Ask students to rewrite their stories as though the "other" energy path had been taken.

FOLLOW-UP/BACKGROUND INFORMATION

Soft Energy Paths: Toward A Durable Peace, Amory Lovins. 1979. Paper $4.95, Harper and Row.

Energy Unbounds: A Table for Americas Future, Amory Lovins. 1986. $17.95 Sierra.

Hard Energy Path - Dependency on large scale production of energy via electrical power plants for a more complex, consumptive lifestyle using mostly non-renewable resources such as coal, natural gas, and petroleum.

Soft Energy Path - Utilization of renewable energy sources, such as solar, wind, water, and biomass in a passive, less consumptive way for a simpler lifestyle.

SOURCE OF ACTIVITY

Dr. Doug Larche

The Tunesmith

SUBJECT Creative Language Arts: Music/ Songwriting

LEVEL 6 - 12

ACTIVITY IN BRIEF

Students will use the energy vocabulary list (see Activity 1) and gather energy vocabulary words, thoughts and concepts, incorporate them into rhyming song lyrics, and set them to music of well-known folk songs.

OBJECTIVE

At the end of this activity the student will: (1) Know the meaning of sixty energy vocabulary words; (2) Have discussed and formulated opinions about energy; (3) Have written rhyming song lyrics about energy; (4) Have set the energy song lyrics to music; (5) Have heard the energy song lyrics of several other groups.

MATERIALS

Paper and Pencils/Pens
guitar, piano or autoharp (optional)

TIME

2 hours

LEARNING CYCLE

AWARENESS - Students will build on earlier knowledge with the energy vocabulary list by gathering and incorporating new and additional concepts.

CONCEPT DEVELOPMENT - By manipulating energy vocabulary words into musical and poetic structures, students can become more familiar with them, better learn their meanings, and learn to use them in context.

APPLICATION - Consider putting together an energy songbook. Musicians may compose original music for the energy lyrics.

FOLLOW-UP/BACKGROUND INFORMATION

Consider using easy, familiar tunes like:
"I've Been Working on the Railroad"
"She'll be Comin' Round the Mountain" or
"Row, Row, Row Your Boat"

SOURCE OF ACTIVITY

I.D.E.A.S. and Dr. Doug Larche.

Mining for Music

SUBJECT Creative Language Arts: Music **LEVEL** 6 - 12

ACTIVITY IN BRIEF

Students will discuss energy and environment inter-relationships, then search for references to them in popular recorded music. They will report on their findings, and bring the recordings to share in class.

OBJECTIVE

At the end of this activity the student will: (1) Have discussed and formulated opinions about the inter-relationship of energy and environment, (2) Have evaluated popular songs and identified energy-environmental references, (3) Have explained, orally, and in written form, those references, (4) Have listened to several other recordings and explanations of the presence of the energy - environment - relationship in song.

MATERIALS

Paper and pencils/pens
records or tapes from library or owned by students,
tape players, stereo

TIME

2 hours

LEARNING CYCLE

AWARENESS - Students will listen to songs (see Background) which depict interrelationships between energy and the environment.

CONCEPT DEVELOPMENT - Students will visit radio stations, search music libraries and shops, talk with music teachers, and then select and present songs that celebrate or describe energy - environment relationships. Students will discuss the relationship between energy and the needs and hopes of people. They will learn about the universality of this relationship.

APPLICATION - Students might generate an article for publication in an energy/environment newsletter or periodical. A music, slide and light show might be presented to feature the findings of this project.

FOLLOW-UP/BACKGROUND INFORMATION

Some titles to start with:
"Sunshine on My Shoulder," "Sixteen Tons," "They Call the Wind Maria," "Volcano," "The Beverly Hillbillies Theme," "Ebb Tide"

Then go to some current songs the kids will know!

SOURCE OF ACTIVITY

Dr. Doug Larche

Earth, Wind, and Fire

SUBJECT Creative Language Arts: Visual Arts **LEVEL** 6 - 12

ACTIVITY IN BRIEF

Students will discuss energy sources as they occur in nature, observe examples of those sources and create a painting or drawing of "energy in nature."

OBJECTIVE

At the end of this activity the student will: (1) Have discussed and formulated opinions upon energy sources as they exist in nature; (2) Have made observations and judgments about that relationship; (3) Have created a painting or drawing which demonstrates energy in nature; (4) Have seen several other energy paintings or drawings.

MATERIALS

Pencils, pens, markers
Chalk, charcoal, acrylics, etc.
Paper on artboard.

TIME

3 - 4 hours

LEARNING CYCLE

AWARENESS - Students will discuss and observe energy sources as they occur in nature.

CONCEPT DEVELOPMENT - As students identify and paint or draw energy sources in nature, they can begin to understand the relationship of energy and environment.

APPLICATION - Consider mounting an art show or a traveling exhibit and tour the school district; or present to energy-conscious or energy-providing organizations.

FOLLOW-UP/BACKGROUND INFORMATION

Consider the sun, the wind,
the water, the trees, the ocean
and the earth.

SOURCE OF ACTIVITY

Dr. Doug Larche

The Second Time Around

SUBJECT Creative Language Arts: Three Dimensional Art

LEVEL 6 - 12

ACTIVITY IN BRIEF

Students will discuss energy waste and recycling, then will create a three-dimensional sculpture using only discarded "junk" items.

OBJECTIVE

At the end of this activity the student will: (1) Have discussed and formulated opinions about energy waste and recycling; (2) Have found "high energy production" discarded items; (3) Have recycled these items into an aesthetic, useful sculpture; (4) Have seen and evaluated several other "recycled sculptures."

MATERIALS

Discarded "junk" materials, adhesive

TIME

3 - 4 hours

LEARNING CYCLE

AWARENESS - Collect the discarded non-food waste from several sources (classrooms, offices, etc.) for a week and form a file for observation and classification. Students will discuss energy waste and recycling; that energy can be reused.

CONCEPT DEVELOPMENT - As students begin to understand the concept of the amount of energy involved in the production of goods and the presence of energy waste, they can begin to understand the financial and environmental economy of recycling. (See Background Information.)

APPLICATION - An in-school exhibit of refuse and finished artwork would share the project and the message with the entire student body. Students might decide to "mine" other discarded items for practical use as well.

FOLLOW-UP/BACKGROUND INFORMATION

Use the example of the production of an aluminum soft drink can. It takes twenty times as much energy to produce a new can as it does to recycle an existing can. Talk about the many products made from petroleum (like plastics, paints, oils, medicines, styrofoam, veneers, etc.).

SOURCE OF ACTIVITY

Dr. Doug Larche

Acting Up

SUBJECT Creative Language Arts: Theatre **LEVEL** 6 - 12

ACTIVITY IN BRIEF

Students will discuss varying points of view regarding off-shore oil exploration and drilling, will identify various interest groups, and will role-play representatives of those groups, in costume and makeup, in a "public symposium."

OBJECTIVE

At the end of this activity the student will: (1) Have discussed and formulated opinions about off-shore oil exploration and drilling; (2) Have researched and discussed varying points of view of different interest groups; (3) Have "walked a mile in the moccasins" of those interest groups; (4) Have role played and presented a symposium on off-shore issues.

MATERIALS

Articles of clothing, theatrical makeup, tables and chairs.

TIME

4 hours

LEARNING CYCLE

AWARENESS - Students will discuss negative and positive views of off-shore drilling, and learn that energy issues are multidimensional.

CONCEPT DEVELOPMENT - By role-playing and engaging in didactic interchange with other students who are also role playing, students can learn the multidimensional nature of energy conflicts. They can begin to understand that there are few clear-cut, easy solutions.

APPLICATION - Public performances or videotaping for future reviewing would be a logical extension. Of course, this technique can be used to role-play many additional issues. Post-symposium debriefing can be very important.

FOLLOW-UP/BACKGROUND INFORMATION

See following pages for articles about off-shore drilling.

SOURCE OF ACTIVITY

Dr. Doug Larche

OFFSHORE OIL AND GAS DRILLING: A NECESSITY FOR U.S. ENERGY SECURITY

by Charles J. DiBona

* * * * * * * * * * * * * * * * * * * *

The United States remains vulnerable to significant interruptions in its oil supply, cautions the president of the American Petroleum Institute. Commenting on an increasingly precarious position maintained by the U.S., this author discusses government restrictions hindering development of domestic petroleum reserves and addresses the environmental concerns regarding offshore oil and gas drilling. Responsible efforts to increase production of these vital fuels will make an important contribution to the U.S. economy and, the author urges, such action must begin soon.

* * * * * * * * * * * * * * * * * * * *

Recent cuts in crude oil prices by some foreign producer-nations and the apparent weakening of the Organization of Petroleum Exporting Countries are seen by optimists as the final proof that price and supply stability for consumers is assured for many years to come. A respite would be nice, but in this case, the cheering is premature, for these reasons:

1. While imports have dropped over the past few years, they remain at significant levels; in fact, they are now on the rise again. In 1983, the U.S. imported nearly a third of the oil it used — about the same percentage imported just before the Arab oil embargo of 1973-74. In the first eight months of 1984, imports were 10 per cent above the first half of 1983.
2. Some 10 per cent of our imported oil comes from the potentially explosive Middle East. Most of those oil supplies must pass through the Strait of Hormuz between Saudi Arabia and Iran. While that oil amounts to about 4 per cent of our total oil supply, we must remember that a disruption of the Middle East would affect all our oil imports.

3. Proven reserves of both oil and natural gas are declining. Indeed, proven reserves of oil have shrunk by 29 per cent since 1970, while reserves of natural gas have declined by 31 per cent. Meanwhile, the

nation faces a prodigious task just to replace what it is using. Over the next ten years, for example, the United States will have to find some 32 billion barrels of domestic crude oil just to replace the domestic reserves we will be consuming.

4. Oil consumption is rising again, as the economy improves. In the first nine months of 1984, oil consumption increased nearly 5 per cent over the comparable 1983 period.

For these reasons, the highly advertised "oil glut" could disappear very quickly. The U.S. energy problem has not been "solved"; it is merely dozing.

In their search for reserves, petroleum companies are increasingly turning to the resources of the Outer Continental Shelf. Studies by the U.S. Geological Survey estimate that these lands may contain large amounts of undiscovered, recoverable petroleum, including as much as 44 billion barrels of oil, 231 trillion cubic feet of natural gas, and nearly 5 billion barrels of natural gas liquids. Some geologists think those estimates are conservative and that a great deal more undiscovered resources may lie offshore.

If the offshore oil and gas supplies estimated by the U.S. Geological Survey can be found and produced within a reasonable time, they can help greatly to cut oil imports and strengthen national security. They can generate more government revenues, improve the nations's balance of payments, provide more secure employment throughout the U.S. economy, and help raise the standard of living of our citizens.

For example, the estimated 44 billion barrels of undiscovered offshore oil alone would be equivalent to twenty-five years of oil imports at the 1983 level. By supplementing other domestic sources, our offshore oil and natural gas could sharply reduce America's vulnerability to a future cutoff of foreign oil.

Roadblocks to Development

Unfortunately, the pace of offshore development has been agonizingly slow. Since the federal leasing program began in 1954, less than 4 per cent of the federal offshore acreage has been leased for oil and gas operations. With the

passage of time, many older leases have expired, leaving less than 3 per cent currently available for exploration and development.

More specifically, the U.S. government has leased a total of nearly 38 million offshore acres over the past three decades, of which about 25 million are currently under lease. Many other countries have moved ahead much more rapidly. For example, since 1964 the United Kingdom has leased 66 million offshore acres and Canada has leased some 900 million acres — nearly 30 times more than the United States. In only twenty years, the United Kingdom has become self-sufficient in oil production and now exports petroleum to the United States and other countries. The Soviet Union, which has enormous onshore oil and gas reserves, is exploring for new supplies in its arctic waters and in the Pacific Ocean off Siberia. China also recently launched new offshore exploration efforts.

In recent years, attempts have been made to speed up the leasing program. Congress made a commitment to more rapid offshore development in the 1978 amendments to the Outer Continental Shelf Lands Act, and the Reagan administration developed and moved ahead on an accelerated leasing program.

Unfortunately, the effort is now hampered by year-to-year moratoria adopted by Congress on the leasing of certain key offshore areas. The pattern began with a moratorium on the 736,000 acres in fiscal year 1982. The following year the total grew to 36 million acres, and in fiscal year 1984 it was more than 52 million acres, affecting areas off the coasts of California, Florida, and Massachusetts. Each year, the moratoria were presented as "temporary" one-year measures, but the amount of offshore acreage placed off limits continued to grow. For fiscal year 1985, Congress dropped the moratorium affecting waters off Florida, but continued the restrictions off California and Massachusetts. And an unsuccessful effort was made in the House of Representatives to ban leasing in certain Alaskan waters.

Thus, in fiscal year 1985, some 45.6 million offshore acres will remain off limits to oil and gas leasing — at a time when domestic demand is increasing, domestic oil and natural gas reserves are declining, and oil imports are rising. That is far more acreage than the federal government has leased since its offshore leasing program began.

Those favoring moratoria argue that these restrictions are not significant because they cover only about 5 per cent of the nation's total Outer Continental Shelf. However, they overlook the fact that some of the potentially most productive offshore acreage has been placed off limits. In addition, some scheduled lease offerings have been canceled, some have been delayed, and some have been sharply reduced in scope. And long-range planning by government agencies and petroleum companies has been disrupted. The resulting uncertainty, exacerbated by numerous lawsuits, has discouraged participation in offshore exploration.

Environmental Risks Reduced

Those who oppose the federal program generally cite environmental risks as a reason for extending moratoria. Yet the record shows that the risk is far less than sometimes portrayed. Through 1983, wells in state and federal waters off U.S. coasts produced more than 10 billion barrels of oil and 76 trillion cubic feet of natural gas. Yet, there was only one spill from these operations in which significant amounts of oil reached the shore — the Santa Barbara Channel accident off California fifteen years ago.

That 1969 accident soiled nearby beaches temporarily and resulted in the deaths of a number of seabirds that could not fly after becoming coated with oil. However, the incident caused far less damage to the channel area than was originally feared. Scientific studies found that there was little impact on fish and other marine creatures and no permanent environmental damage to the area. The spilled oil was cleaned up, the bird populations reestablished themselves, and the area returned to normal. Today, the Santa Barbara Channel shows no lasting effects from that spill. Moreover, the Interior Department recently reported that since 1970, there has been no well blowout resulting in the spillage of more than one barrel of oil in any of the exploratory and development drilling or well-completion activities in U.S. waters.

Few Americans are aware of the fact that natural oil seeps account for more petroleum entering U.S. coastal waters than drilling and production. Such seeps exist in many ocean areas, including some where no drilling has ever taken place. Natural seeps in the Santa Barbara Channel are estimated to leak 100 or more barrels of oil daily into the sea. Over the 1971-82 period, an

average of only 16 barrels a day of natural seepage would have added more oil to the marine environment than did all of America's offshore exploration and production activities — nationwide — in that 12 year period.

Over the past decade, federal and state governments have adopted much more stringent environmental laws and regulations governing offshore operations. The petroleum industry has made vast improvements in production technology and safety equipment. Those efforts are continuing. Therefore, the industry's environmental record should be even better in the future. Under federal law, companies engaged in offshore operations are liable for damages and responsible for cleanup if they cause environmental damage. Thus, the law encourages investment in research, in facilities, and in procedures designed further to reduce the possibility of environmental damage.

Drilling Platforms Promote Fishing

After decades of operations, there is overwhelming evidence from both U.S. and foreign offshore areas to show that oil exploration and production are compatible with both commercial and sport fishing. Offshore oil and gas exploration today is conducted in the waters of more than 64 countries. Many of these regions are also major commercial fishing areas, such as the North Sea, Cook Inlet (Alaska), the Persian Gulf, the Bass Strait (Australia), and the Java Sea.

Where U.S. offshore activity has been most intensive — in the Gulf of Mexico — there have been substantial increases in both the tonnage of fish caught and the dollar value of the catch in the thirty years since the first federal lease sales there. This continutation and increase in fish catches indicates that oil and gas operations can be compatible with commercial fishing.

Sport fishermen in the Gulf of Mexico report good fishing around many oil and gas platforms, and fishing boats congregate nearby. The platforms serve as artificial reefs — as piers always have — attracting sea life, such as barnacles, anemones, mollusks, and other small animals and plants. These attract small fish which, in turn, become food for larger game fish.

Benefits to the U.S. Treasury and Economy

Far outweighing the relatively minor environmental risks are the economic benefits to be achieved. The country's oil imports bill for 1983 exceeded $50 billion, and over the past five years totaled a staggering $328 billion. With expanded development of this country's offshore energy resources, we can reduce the amount of foreign oil we import, send fewer dollars abroad, and further weaken the ability of the foreign oil producing cartel to raise world oil prices.

In addition, increased federal offshore revenues would contribute toward reducing the federal deficit. From 1954 through 1983, oil companies paid the federal government more than $42 billion for "hunting licenses" — for the right to look for oil and gas in federal offshore waters. Another $335 million was paid in rental fees. And more than $20 billion went to the federal government from royalties on the oil and gas produced from those leases. Thus, through 1983, U.S. citizens received in their Treasury in excess of $68 billion from petroleum operations in the federal offshore domain.

The market value of that production was $127 billion. Thus, almost 54 per cent of the value of petroleum produced in federal offshore areas through 1983 went to the federal government — even before income taxes were paid. The oil companies' share to date has been 46 per cent of the value from those operations, from which they paid their exploration, development, production, and transportation costs — as well as the federal income tax.

Summing Up

Expanded U.S. offshore petroleum development can strengthen America's energy security. Development of America's offshore petroleum resources will help reduce imports and will substantially lessen the dangers to our nation if future oil import disruptions occur. The most important lesson learned from the oil crises of the 1970s was the cost to this country of being unprepared. Because of the years required to find and develop new offshore fields, we cannot afford to wait until a crisis occurs before starting to explore for new offshore supplies.

Americans would clearly benefit from the energy produced by offshore development. Moratoria are simply not a sensible response to our developing energy problems. Such responsible development, at an expanding, orderly, and environmentally safe pace, would also make a significant contribution to the nation's economic health and security.

Reprinted with permission from
"Public Utilities Fortnightly" -
December 6, 1984.

LOUISIANA'S BAYOU BLUES

One acre of wetlands disappears every 14 minutes

For thousands of years the lush marshlands of Louisiana's Terrebonne (Good Earth) Parish were a marvel of natural evolution. Fed by rich sediment from the Mississippi River, they grew into an expansive green paradise of cypress and oak, roamed by fauna of every description. The state's wetlands supply nearly half of North America's fur harvest and are the spawning grounds for one-third of the nation's fisheries. But these days the "good earth" is being devoured by the Gulf of Mexico at a staggering rate: 60 square miles of Louisiana's coast are vanishing every year, one acre every 14 minutes. If the erosion continues unchecked, scientists say Terrebonne and three other coastal counties will have all but disappeared by the middle of the next century — and waves will be lapping over the New Orleans suburbs.

Louisiana's bayou blues stem from a variety of natural and man-made causes. Sea levels are rising, as they are on all U.S. coasts, and a vast maze of canals and levees in the gulf region is hastening the devastation. Since oil was discovered in the area in the 1930s, petroleum companies have dredged more than 10,000 miles of canals to get to the riches. The Army Corps of Engineers has built hundreds of miles of levees and waterways to facilitate navigation and keep the mighty Mississippi from overflowing. Those flood-control structures have upset the fragile ecological balance in the delta, preventing fresh river water and sediment from nurturing the marsh, while the oil dredging has allowed saltwater from the gulf to creep inland and eat at the vegetation. "What those canals have done to the marsh is the same as the insidious, cumulative effect of hundreds of small cuts to the body," says Eugene Turner, a coastal ecologist at Louisiana State University.

Environmentalists say the wetlands crisis shows what can happen after unshackled development of oil and gas reserves. And worse may be on the way. Unless congress blocks it by the end of this month, the Reagan administration will embark on a new five-year plan to offer millions of acres of the outer continental shelf for oil and gas exploration. Louisiana's plight gets no special consideration; instead, while offshore-exploration leases elsewhere will be sold only in alternate years, offshore leases in the Gulf of Mexico will be offered every year, and oil companies would dredge through Louisiana's

wetlands once again to gain access to them. "What we are talking about here is a problem of national significance," says Donald Boesch, director of the Louisiana Universities Marine Consortium. "We are still expected to provide the country with cheap oil and gas, yet we get nothing in return."

RAVAGED LANDSCAPE: For now, though, the energy reserves nearest to shore are dwindling, and many oil companies have pulled out — leaving the ravaged landscape behind them. Generations of local residents who had grown dependent on the oil revenues and were willing to overlook the environmental damage now feel seduced and abandoned. Unemployment in Terrebonne has reached 21 percent — and resentment is rising. "The oil companies put our kids through college, brought us hospitals and a living," says Joel Lapeyrouse, whose family has run a general store in Cocodrie for five generations. "Now they are gone and we are going back to Mother Nature."

For all the dire predictions, little has been done to avert further erosion. The federal government has not offered much assistance — partly because Louisiana, unlike other states, did not ask for it until recently, when oil revenues began drying up. Now state officials say that cash-starved Louisiana can do little without federal help. The state's lawmakers have introduced bills in Congress that would authorize up to $300 million for the nation's 10 most seriously eroding coasts. But the budget deficit has left such projects near the bottom of the priority list.

Most of the state's own efforts have been mired in political swamps — what local geologists call "sand wars." In 1981 Louisiana set aside $35 million for a coastal-protection plan, focusing first on the barrier islands, the wetlands' only line of defense against hurricanes that rip up the marsh and increase saltwater penetration. In one pilot project, scientists from the Louisiana Geological Survey have brought back a mile-long portion of Isles Dernieres through "beach nourishment" — replacing the sand and planting it with grass. Though still not a permanent solution, scientists say beach nourishment is the best strategy to combat beach erosion, and the state Department of Natural Resources has allotted $23 million for similar projects. But engineers and some politicians are still looking for alternatives — including sea walls, which geologists say would cost 10 times as much and probably not do any good. As a result, the project has been postponed by more than a year and experts expect delays to run at least another year.

Scientists are even further from a solution for the loss of the wetlands themselves; there is no precedent for preservation on the scale required in Louisiana. Meanwhile, private landholders, who own some 70 percent of the marshlands, are taking matters into their own hands, cordoning off portions of the area in the name of "marsh management." Barred by fences, gates and armed guards, local trappers and fishermen are furious. "They call this marsh management," says Michael Osborne, an attorney representing fishermen in a suit against one landowner. "But they are just trying to block off the canal system for their own access to fish and wildlife."

LITTLE FAITH: About the only encouraging sign is that the crisis is being addressed seriously. A citizens' coalition is calling for an end to the disputes among landowners, scientists and politicians. The Army Corps of Engineers is studying plans to redistribute some of the Mississippi's valuable water into the delta. There are even indications that the oil and gas companies, long allowed free rein over the wetlands, will be closely scrutinized if drilling activity picks up again. The state Department of Natural Resources has instituted stricter reviews for dredging requests, and experts are looking at alternative ways of getting drilling equipment to offshore sites. One possibility: Hovercraft, which would transport gear over the marsh instead of through it.

Still, scientists say that at this point there is no way to stop the erosion, only slow it down. And environmentalists fear that if the oil market comes back, the oil companies' roughshod ride will return with it. In the wetlands themselves, faith is fast running out. Lapeyrouse, who ran oilcrew boats for 20 years, is building a shrimp-offloading shed — returning to the only business that currently reaps profits. But trapper Pats Johnson, who catches only about half the muskrat and nutria he used to in a good year, fears that soon shrimping will be gone, too. "If something isn't done, my grandchildren won't be able to make it," he says. "There won't be animals to trap, shrimp to catch — there won't be no marshland." At the rate Louisiana is vanishing, that day may not be far off.

Frank Gibney, Jr.
Reprinted by permission from
Newsweek Magazine, June 22, 1987.

ON USING AMERICA'S OFFSHORE OIL

by John Dillin

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Mr. Dillin is a staff correspondent of The Christian Science Monitor. From "Offshore Oil: America's Trillion-Dollar Decision" by John Dillin, The Christian Science Monitor. April 19, 1974:

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Offshore oil — America's trillion-dollar treasure — poses one of the most critical energy questions of the 1970s.

Future generations, looking back on this decade, will judge what today's Americans did with one of the nation's most precious natural assets — a vast offshore reservoir containing half the oil and natural gas left in the U.S.

Oil and gas are nonrenewable resources. When they're burned in cars, planes, and home furnaces, or used to make plastic toys, synthetic shirts, or sandwich wrap, they are gone. They cannot be replaced. Encouraged by their government, Americans are embarking on policies that will speed depletion of these rich resources. "Operation Independence," President Nixon's proposal, is such a plan.

The President would free the United States of the need for energy imports by 1980. This would be achieved by hiking U.S. production of oil from 10.9 million barrels a day at present to 14 million barrels a day by 1980. Natural gas output also would be increased sharply, along with production of coal, nuclear energy, geothermal power, and shale oil. Most of the increased oil and gas output would come from public lands — offshore resources in the Atlantic, Gulf, and the waters around Alaska. Mr. Nixon has ordered offshore leases sold at the rate of 10 million acres a year, beginning in 1975. Such sales in a single year would nearly equal all offshore federal sales in the last two decades.

Federal officials hope that offshore oil and gas will be America's transition fuel to the future. When the richest oil reserves run out, the country hopefully could shift to nuclear power and solar energy for its needs. Private industrialists generally take a similar approach. Their solution to the energy problem, simply stated: Turn private enterprise loose, and it will bring Americans energy at the lowest possible prices in the greatest possible abundance. They urge the United States to move as quickly as possible to develop not only offshore oil and gas, but any other promising energy form, from oil shale to coal gasification.

However, growing opposition to the thrust of U.S. policy is making itself felt.

A number of environmentalists, ecologists, energy specialists, and other Doubting Thomases contend this is not the moment to rush like lemmings into the sea. Their response to the cry to drill, drill, drill is to conserve, conserve, conserve. They argue that government and industry have built too many highways, too many cars, shoddy and poorly insulated houses, inefficient buildings, and a host of other energy-wasteful items. They urge Americans at this crossroads to take stock, to conserve what the U.S. has, to manage frugally and intelligently for the future. They look suspiciously at predictions of an offshore oil bonanza in the Atlantic and Alaska. They observe that the widely heralded undersea reserves are still unproven, and that pushing ahead on the assumption that the oil is there is foolhardy.

PLANNING FOR THE LONG HAUL OR QUICK GAIN?

They urge America to plan for the long haul, rather than the quick gain. They would opt for an enduring society, perhaps at the expense of some creature comforts for the present generation.

The citizen in superabundant America might ask: What about shale oil? After all, aren't U.S. reserves of shale oil more than triple all the petroleum reserves of the Middle East? And the U.S. has more than half the world's coal. What about that — and nuclear energy, and solar energy?

Environmentalists respond that shale-oil technology is not perfected. Wide-scale extraction of shale oil may do immense damage to the environment. Coal, too, raises environmental worries, as does nuclear power. Large-scale use of solar energy will require scientific breakthroughs not yet in sight.

U.S. officials, however, are firm in their contention that this is the moment to plunge into offshore oil.

William A. Vogely, acting deputy assistant secretary for energy and minerals, was one of the officials who pushed for expansion of offshore leasing. U.S. policy, until now, was to lease offshore lands "when we thought there was a market," Mr. Vogely noted during an interview in his Washington office.

"The turnaround [downward] in domestic production capacity caused us to rethink that policy. Starting in 1972, the rate of leasing was substantially increased. It went from 800,000 acres in 1972 to more than one million acres in 1973, over three million acres in 1974, and 10 million in 1975.

"The logic is really very simple. The onshore resources of the U.S., with the exception of the north slope of Alaska, have been thoroughly explored.... Exploration onshore will continue to pay off, but less than in the past.

"On the other hand, the OCS [outer continental shelf] is untested, except the gulf of Mexico and southern California....We believe that per unit of exploratory effort, the initial payout will be very high offshore compared to the alternatives onshore."

Reprinted with permission of
Current, June 1974.

Makeup and Mannequins

SUBJECT Creative Language Arts: Theatre **LEVEL** 6 - 12

ACTIVITY IN BRIEF

Students will use makeup and/or simple puppetry to "become" the flora and fauna of a forest. They will improvise, through sound, movement and spoken dialogue, the role of energy in their lives as (1) a virgin forest, (2) when the developers come, and (3) in the aftermath.

OBJECTIVE

At the end of this activity the student will: (1) Have discussed and formulated opinions about the inter-relatedness of energy and all life forms; (2) Have developed empathy for various life forms in the energy cycle; (3) Have discussed and formulated opinions about the impact of development on the environment; (4) Have made puppets and used theatrical makeup; (5) Have role-played the flora and fauna of a forest.

MATERIALS

Theatrical makeup, cotton gloves, markers, paper bags, glue, feathers.

TIME

2 hours

LEARNING CYCLE

AWARENESS - Through puppetry and/or improvisation, the students will become the flora and fauna of a virgin forest visited by developers.

CONCEPT DEVELOPMENT - The students will discuss the direct relationship between development, energy, and the environment. By doing so, they will experience a new perspective and empathy about the universal, mutually dependent nature of energy and environment.

APPLICATION - Post-performance position papers can help students verbalize their basically non-verbal experiences.

FOLLOW-UP/BACKGROUND INFORMATION

Make inexpensive and fun puppets by gluing craft decorations on the fingers of a cotton glove. Make generous use of liquid lather and lots of textures (feathers, tissue, cotton, etc.) for makeup.

SOURCE OF ACTIVITY

Dr. Doug Larche

Le Machine

SUBJECT Creative Language Arts: Movement **LEVEL** 6 - 12

ACTIVITY IN BRIEF

Students use jumping, moving, dancing, pantomime and sound to become interactive parts of a "people" machine; then use the same skills to become part of the energy chain.

OBJECTIVE

At the end of this activity the student will: (1) Have discussed and formulated opinions about the inter-relatedness of all things, especially the energy chain, (2) Have creatively engaged in movement in the "people machine" and the "energy chain", (3) Have functioned creatively and cooperatively in a group.

MATERIALS

Open, unobstructed space

TIME

1 hour

LEARNING CYCLE

AWARENESS - Students will discuss and demonstrate how energy transfer and conversion occur using desk top activities, thus learning that energy can be transferred and converted.

CONCEPT DEVELOPMENT - By creatively becoming part of "Le Machine," students will experience the concepts of cause and effect and transfer of energy. By becoming part of the energy chain, they will identify specific places and moments of energy conversion. (See Background Information.)

APPLICATION - Students could teach these exercises to elementary school students or other children's groups and at energy awareness meetings.

FOLLOW-UP/BACKGROUND INFORMATION

To get started: The teacher should demonstrate conversion and transfer and involve students in desk-top activities by using simple experiments with chemical, light, heat and sound energy. Examples: dropping an eraser, flipping a pencil, whistling, blowing paper off a table, turning on a light.

"Le Machine"

Have one student stand in the center of the room and begin aiming a repetitive motion and an accompanying interesting noise.

A second student joins the machine by reacting to the repetitive movement of the first. Each student then joins the machine by responding to the preceding motion and sound and creating another one. By the time all the students are involved in the machine, you should have a calliope of sound and motion!

Then, pantomime the energy chain, by having the students represent each of the various conversions. (See Energy Conversions.)

SOURCE OF ACTIVITY

I.D.E.A.S./Duane Toomsen and Dr. Doug Larche

ENERGY CONVERSIONS

Roles People Play

To demonstrate visually the concept of energy conversions, the following describes an activity that allows for active participation of all members of a class in an energy conversion simulation.

One individual is selected (usually wearing yellow or orange) to represent the sun. This individual can practice dramatic sun rises while other groups are being organized.

Five or less individuals will form a windmill that turns clockwise with left arm extended to form vanes. After the sun rises, light energy is converted to heat energy, which warms the air molecules. Movement by air molecules and other extenuating circumstances causes the wind to blow, thereby turning the mechanism that activates the electrical generating turbine. (This group may practice roles.)

Five or less individuals form a circle with their backs toward the center. They place their arms around one another's waist, and as the windmill begins to turn they gently bump hips to simulate electrical energy generation. This is the electrical turbine, and they may wish to practice their assignment.

One radio announcer, using body energy and electrical energy, will communicate via sound energy to the listening audience from radio station KNRG. The announcer will sign on giving details about the call letters, station location, time, weather, etc.

Two individuals will do a heat dance by moving throughout the room demonstrating heat (waste) being given off by friction in the windmill, turbine, electrical generating lines, by the body of the radio announcer, and the equipment this person is using.

All remaining individuals will form a transmission line directing the energy flow from the turbine to the radio announcer. By holding hands they will simulate energy electrical flow by gently squeezing of one another's hands.

Conversion Process:

Sunlight - Light to heat energy, to wind to electrical energy, back to heat, light and sound. Heat is the lowest form of energy and most difficult to concentrate effectively and efficiently. Students will be able to observe simulated energy changes as a result of this activity.

by Duane Toomsen

United Mime Workers

SUBJECT Creative Language Arts: Mime **LEVEL** 6 - 12

ACTIVITY IN BRIEF

Students will use unsophisticated mime movement to "act out" energy scenarios involving feelings. They will perform alone and in small groups to create scenarios and perform scenes.

OBJECTIVE

At the end of this activity the student will: (1) Have discussed and formulated opinions about "value-laden" nature of energy issues; (2) Have identified feelings and emotions that arise in various energy scenarios; (3) Have nonverbally expressed feelings and emotions about various energy scenarios; (4) Have functioned creatively and cooperatively in a small group; (5) Have seen several other energy-related mime presentations.

MATERIALS

Open unobstructed space, (Optional: Theatrical Makeup)

TIME

2 hours

LEARNING CYCLE

AWARENESS - Students will explore their feelings about energy issues, learning that they are value-laden and cause an emotional response in people. Keep a list of issues.

CONCEPT DEVELOPMENT - Drawing from the list of ideas, students will encode their emotions about energy into non-verbal statements using mime movement.

APPLICATION - Papers and post-exercise discussions will encourage students to verbalize their non-verbal experiences. This exercise, of course, can be used many times for many subjects.

FOLLOW-UP/BACKGROUND INFORMATION

Invite your mime director, mime student or community resource person to spend a few minutes teaching some basics of mime to your class. It will make this activity much more rewarding and even more fun.

SOURCE OF ACTIVITY

Dr. Doug Larche

Alone Aloud

SUBJECT Creative Language Arts: Oral Interpretation

LEVEL 6 - 12

ACTIVITY IN BRIEF

Students will research prose, poetry, dramatic literature and song lyrics to find passages about our mutual dependence upon, use or abuse of energy, and read them orally for the class.

OBJECTIVE

At the end of this activity the student will: (1) Have researched and evaluated various forms of literature, (2) Have selected, prepared and orally presented literature which is energy-related, (3) Have heard several other energy-related oral interpretation presentations.

MATERIALS

Paper and pencils/pens, access to a library.

TIME

3 hours

LEARNING CYCLE

AWARENESS - By researching and reading, students will gather examples of literature which have references to the dependence upon, use, and abuse of energy.

CONCEPT DEVELOPMENT - Students will select, study and rehearse a particular piece of literature, thus, learning more about the universality of the relationship between energy and people.

APPLICATION - The performances can be shared in classrooms, assemblies and service clubs.

FOLLOW-UP/BACKGROUND INFORMATION

Talk with your forensics (competitive speech) coach or English teacher about how to structure a literary program and for a few tips on oral reading.

SOURCE OF ACTIVITY

Dr. Doug Larche

United We Stand

SUBJECT Creative Language Arts: Readers Theatre/Choral Reading **LEVEL** 6 - 12

ACTIVITY IN BRIEF

Groups of students will combine segments of prose, poetry, drama and song with original narrations to create an "Energy and Environment" presentation, then rehearse and present it using techniques of readers theatre and choral reading.

OBJECTIVE

At the end of this activity the student will: (1) Have discussed and formulated opinions about energy and environment, (2) Have researched, evaluated and selected literature which is energy and environment-related, (3) Have created cooperatively, a readers theatre/choral reading script with original narration, (4) Have rehearsed and performed that script, (5) Have heard and seen several other energy-related performances.

MATERIALS

Paper, pencils, pens and folders

TIME

4 hours

LEARNING CYCLE

AWARENESS - Students will search for literature which is energy and environment-related. They will seek to discover the powerful statements regarding energy made by the authors.

CONCEPT DEVELOPMENT - The students either working alone or in small groups, will write a narration and organize an energy-related choral reading.

APPLICATION - These performances can be shared in classrooms, assemblies, service clubs, or while touring elementary schools.

FOLLOW-UP/BACKGROUND INFORMATION

Talk with your large group forensics (competitive speech) coach or English teacher for some tips on putting together a choral reading or readers theatre script, assigning roles, blocking and performing.

SOURCE OF ACTIVITY

Dr. Doug Larche

Freedom of Speech

SUBJECT Creative Language Arts: Speech Communication **LEVEL** 6 - 12

ACTIVITY IN BRIEF

Students will identify an issue of interest in "New Technologies in Energy", research, organize, rehearse and deliver a 4-7 minute speech on the issue.

OBJECTIVE

At the end of this activity the student will: (1) Have discussed, researched and formed opinions about a new energy technology; (2) Have written, organized and supported a speech on that issue; (3) Have delivered a 4-7 minute speech based on that preparation; (4) Have heard several other speeches about other new energy technologies.

MATERIALS **TIME**

Paper, pencils/pens, access to a library 2 hours

LEARNING CYCLE

AWARENESS - By using the attached list, students will familiarize themselves with the existence of new technologies in energy.

CONCEPT DEVELOPMENT - Students will research, organize, and present a speech concerning some new energy technology.

APPLICATION - These speeches can be shared in classes, assemblies and service clubs, and may lead to more research and subsequent papers and projects.

FOLLOW-UP/BACKGROUND INFORMATION

Use a simple "introduction, body, and conclusion" format.

SOURCE OF ACTIVITY

Dr. Doug Larche

SOME NEW TECHNOLOGIES IN ENERGY

(Each can be broken into several smaller types)

New coal technologies

Ceramics

Nuclear Fusion

Sea Gradient

Low Head Dams and Hydroelectric Power

Coal Gasification

Biomass/Methane Conversions

Geothermal

Tidal

Solar Power

Wind Power

Photovoltaics

Computer Chips

Lasers

Affirmative Action

SUBJECT Creative Language Arts: Debate **LEVEL** 6 - 12

ACTIVITY IN BRIEF

Through guided discussion, students will identify several areas of conflict on energy issues. In small groups they will research, prepare and participate in a debate on one of these issues. The next week, each group will debate the other side of the issue.

OBJECTIVE

At the end of this activity the student will: (1) Have discussed and formulated opinions about several areas of conflict in energy; (2) Have researched, prepared and presented a debate case supporting one side of one issue; (3) Have researched, prepared and presented a debate case supporting the other side of the same issue; (4) Have worked cooperatively and responsibly in a small group; (5) Have heard several other debates on areas of conflict in energy.

MATERIALS

Access to a library, tables and chairs, paper, pencils/pens.

TIME

4 - 5 hours

LEARNING CYCLE

AWARENESS - Through guided discussion, the student will identify issues and areas of conflict in energy research and usage. (See Background Information.)

CONCEPT DEVELOPMENT - Students will learn both sides of the issue as they research, organize, and prepare to debate some controversial energy-related issue.

APPLICATION - Students will debate the issue using the format suggested in the background information. Debates can be very instructive when seen by other classes. The debate format can be used for many other issues as well.

FOLLOW-UP/BACKGROUND INFORMATION

Try 2 - 4 members per team, and the following "debate" pattern:

3 minutes	1.	Opening prepared statement of affirmative team.
3 minutes	2.	Opening prepared statement of negative team
3 minutes	3.	Affirmative team presents plan
3 minutes	4.	Negative team rebuts plan
5 minutes	5.	Affirmative team asks questions of negative team
5 minutes	6.	Negative team asks questions of affirmative team
3 minutes	7.	Final statements of affirmative team
3 minutes	8.	Final statements of negative team

SOURCE OF ACTIVITY

Dr. Doug Larche

MAJOR THREATS TO ENVIRONMENTAL QUALITY IN NORTH AMERICA

A 1987 survey of environmental educators in the U.S. identified major threats to environmental quality in North America. Listed below are the study topics in the approximate order of their threats as ranked by the educators. However, since the educator's rankings often overlapped among 7 subgroups, the topics have been regrouped with similar or related threats. It is hoped that teachers and students will find the topics provoking.

Group 1. Ground Water and Drinking Water Contamination
- Toxic surface water pollutants
- Point source water pollution
- Non-Point source water pollution
- Water scarcity
- Hazardous Waste
- Radioactive waste disposal
- Damage to marine environments
- Chemicals in food chains
- Solid waste disposal
- Chemical fertilizer
- Acid deposition
- Toxic Air Pollutants
- Pesticides
- Ambient air pollutants

Group 2. Urban Sprawl
- Urbanization
- Crowding
- Indoor air pollution
- Noise
- Aging infrastructure
- Population growth
- Critical materials scarcity
- Energy scarcity
- Salinization of Ag Soil
- Soil erosion
- Over exploitation of soils
- Desertification

Group 3. War
- Nuclear accidents
- Terrorism
- Bioengineering wastes & mistakes
- Mutagens
- Proliferation of biological organisms
- Chemical plant explosions
- Depletion of Ozone Layer
- Weather modifications
- CO^2 accumulation in the atmosphere
- Electronic pollution (O^3 from office machines)
- Microwave radiation
- Ocean Fishery Depletion
- Loss of rain forests
- Costal area degradation
- Wetland loss
- Wilderness & scenic area degradation
- Plant & animal species loss

LA48

Group 4. Floods
Drought
Pathogens from human waste
Earthquakes
Volcanoes
Other natural disasters
Radioactive debris from outer space

Picture This

SUBJECT Creative Language Arts: Photography

LEVEL 6 - 12

ACTIVITY IN BRIEF

Students will discuss the phrase, "There is energy in joy," "there is energy in sadness", then interpret the phrase creatively. Each student will capture three expressions of the phrase through still photography.

OBJECTIVE

At the end of this activity the student will: (1) Have discussed and formulated opinions about the effect of energy on human emotion; (2) Have discussed and formulated opinions about energy and joy, and energy and sadness; (3) Have planned, photographed and developed three pictures demonstrating that relationship; (4) Have seen several other photographic demonstrations of the relationship.

MATERIALS

Cameras and film

TIME

3 hours

LEARNING CYCLE

AWARENESS - Students will search through magazines and find pictures which illustrate the relationship between energy and the quality of life.

CONCEPT DEVELOPMENT - Students will discuss the phrase "There is energy in joy... There is energy in sadness," relating to the pictures found in the awareness stage. Each student will then interpret the phrase through still photography, capturing the effect of energy on human emotion and the quality of life.

APPLICATION - An in-school exhibit followed by a touring exhibit would allow many people to benefit. A local paper may feature some of the photos as well.

FOLLOW-UP/BACKGROUND INFORMATION

Don't forget to use advertisements. Be both literal and symbolic in your interpretation.

SOURCE OF ACTIVITY

Dr. Doug Larche

You're In The Movies

SUBJECT Creative Language Arts: Video **LEVEL** 6 - 12

ACTIVITY IN BRIEF

Students will discuss the way in which the energy from the sun eventually reaches appliances and vehicles. Groups of students will compose and photograph video essays documenting the conversions.

OBJECTIVE

At the end of this activity the student will: (1) Have discussed and formulated opinions about the energy chain; (2) Using video equipment have photographed the moments or places of conversion in the energy chain; (3) Have written and recorded a narrative explaining the process of the energy chain.

MATERIALS	**TIME**
Video equipment and blank cassettes	5 hours

LEARNING CYCLE

AWARENESS - Students will review the energy chain in "Le Machine" and "Energy Conversions" (activity 9), so as to reinforce their knowledge of energy conversions.

CONCEPT DEVELOPMENT - Students will identify the moments and places of energy conversion along the sun-to-appliance-or-vehicle pathway. Groups of students will compose and photograph video essays documenting the conversions..

APPLICATION - The videos may be kept for future study, or shown in classes, assemblies, service clubs or at an "energy night." A local cable TV station may be willing to show the videos.

FOLLOW-UP/BACKGROUND INFORMATION

Review the energy chain from "Le Machine and the Chain Gang".

SOURCE OF ACTIVITY

Dr. Doug Larche

Getting It All Together

SUBJECT Creative Language Arts: Production Capstone **LEVEL** 6 - 12

ACTIVITY IN BRIEF

Students will write, cast, direct, perform in and present a production about energy which combines elements of creative writing, music, art, drama, movement, oral interpretation, speech and photography.

OBJECTIVE

At the end of this activity the student will: (1) Have organized the existing energy/arts projects; (2) Have written original narration interpreting the inter-relatedness of the projects; (3) Have synthesized the projects and script into a logical, meaningful presentation; (4) Have presented the capstone production; (5) Have reviewed all of the energy issues studied in each project.

MATERIALS

Performing space, materials from earlier projects.

TIME

2 weeks

LEARNING CYCLE

AWARENESS - Students will familiarize themselves with the vocabulary suggested in the activity "Metre-Made" on page 1.

CONCEPT DEVELOPMENT - Each student will choose a media (creative writing, music, art, drama, movement, and oral interpretation, speech and photography) to demonstrate and cap what has been learned regarding energy and the inter-relatedness of energy, environment, motion, valuing, conflict, and quality of life.

APPLICATION - This presentation might be the capstone of NEED week or presented to the student body or the public on Iowa Energy Education Day. Videotapes of the production could be circulated to energy conferences and to other schools.

FOLLOW-UP/BACKGROUND INFORMATION

Consider talking with your director of theatre, music director, or community resource person for help in staging your extravaganza, "Break a Leg!"

SOURCE OF ACTIVITY

Dr. Doug Larche